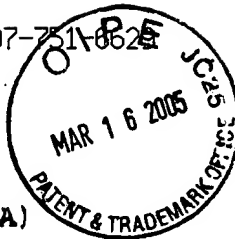


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FROM-

Y-237 P 002

F-016



FS-00504 (02890033AA)

PATENT APPLICATION

1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

John O. Moody et al.

Confirmation No.: 3407

Serial No.: 09/692,538

Group Art Unit: 2635

Filed: October 20, 2000

Examiner: N. Nguyen

For: ASSET TRACKING USING WIRELESS LAN INFRASTRUCTURE

Commissioner of Patents and Trademarks
Washington, D.C. 20231

DECLARATION UNDER 37 C.F.R. 1.131

OF

JOHN O. MOODY AND ERIC R. STEINBRECHER

Sir:

John O. Moody of 1321 Campus Drive, Vestal, New York 13850 and Eric R. Steinbrecher of 3722 Cobblestone Court, Binghamton, New York 13903 declare as follows:

1. We are the joint inventors of the invention disclosed and claimed in U. S. Patent Application S. N. 09/692,538 entitled ASSET TRACKING USING WIRELESS LAN INFRASTRUCTURE, filed October 20, 2000. We read the application and executed the declaration thereof on October 12, 2000.

2. We are employees of Lockheed Martin Corporation and conceived and reduced to practice in the United States the invention disclosed and claimed in U. S. Patent Application 09/692,538, while employed by Lockheed Martin Corporation at Owego, New York.

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3. The invention disclosed and claimed in U. S. Patent Application 09/692,538 was made in the United States prior to July 13, 2000, the filing date of U. S. Patent 6,659,947 B1 to Carter et al. which was issued on December 9, 2003, and which has been applied by the Examiner against the claims of U. S. Patent application 09/692,538.

4. The invention disclosed and claimed in U. S. Patent application 09/692,538 was conceived in the United States prior to July 13, 2000, as indicated by copies of drawings used to describe the invention which are attached as Exhibit A. These drawings are print-outs of electronic files stored at the Lockheed Martin Facility in Owego, New York, and were last modified prior to July 13, 2000. The year on the cover page of these drawings has been obliterated but is prior to July 13, 2000. Page 4 of Exhibit A illustrates the architecture of the system in accordance with the invention disclosed and claimed in U. S. Patent Application 09/692,538 and is similar to Figure 1 of that application, illustrating integration of RFID tags with a wireless computer network infrastructure. Pages 5 - 8 of Exhibit A illustrate and refer to applications of the invention discussed in U. S. Patent Application 09/692,538. Page 10 of Exhibit A refers to problems of proprietary RFID tags and recognizes compatibility of the existing local area network in building 201 of the Lockheed Martin facility in Owego, New York with RFID tags.

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5. The invention disclosed and claimed in U. S. Patent Application 09/692,538 is described in an internal Lockheed Martin Corporation document entitled "Automatic Asset Location Sensing" attached as Exhibit B. The year indicated on the document has been obliterated but is prior to July 13, 2000. Exhibit B indicates joint inventor John O. Moody as the principal investigator, summarizes potential applications of the invention noted in Exhibit A and, on the second page thereof, discusses the invention, noting that the "RFID-based system will run on top of the wireless LAN, underlining the LMFS capability for integrating diverse system and extending the functionality of old systems" and "[t]he access points of the wireless network are very similar to RFID readers". Exhibit B thus indicates substantial completion of the invention prior to July 13, 2000, although an actual reduction to practice had not been made as of the date of Exhibit B.

6. Exhibits C and D are internal documents of Lockheed Martin Corporation which contain a Project Number that refers to a year which has been obliterated but which is prior to July 13, 2000.

7. An internal document of Lockheed Martin Corporation entitled Asset Tracking Demo is attached as Exhibit E. Exhibit E lists hardware and software requirements for an internal demonstration, details set-up for the demonstration including a reference to specific software to be run during the demonstration and a description of the functions of the invention to be demonstrated and observed. Exhibit E was prepared and the invention successfully operated and demonstrated and thus actually reduced to practice prior to July 13, 2000.

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4

8. An internal Lockheed Martin Corporation invention disclosure describing the invention disclosed and claimed in U. S. Patent application 09/692,538 is attached as Exhibit F. The date of preparation of Exhibit F has been obliterated but is prior to July 13, 2000. Exhibit F describes the invention in detail including the subject matter of the claims, as most recently amended.

9. The original documents corresponding to Exhibits A - F were all created in the United States and the activities to which they correspond all occurred in the United States.

10. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-referenced application and any patent issuing thereon.

Date

3/16/05
John C. Moody

Date

3-16-05
Eric R. Steinbrecher

MAR-15-2005 15:20 FROM-

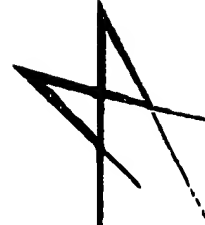
T-237 P 006/028 F-016

Automatic Asset Location Sensing

Innovative Investment [REDACTED] - Proposal Abstract

Principal Investigator: John Moody, Ph.D.

LOCKHEED MARTIN





Asset Location Sensing

Motivating Technology

Automatically determine the location of specially tagged objects within an indoor environment.

- Systems for increased productivity and efficiency
- Permits previously unrealizable levels of automation

IR&D Objective

Develop an *innovative* implementation of asset location sensing technology that will

- Integrate location sensing devices with existing wireless LAN networks,
 - Reduce costs and infrastructure requirements for customers wishing to implement this technology, and
 - Increase the potential for LMFS *systems integration business*.
-

Overview

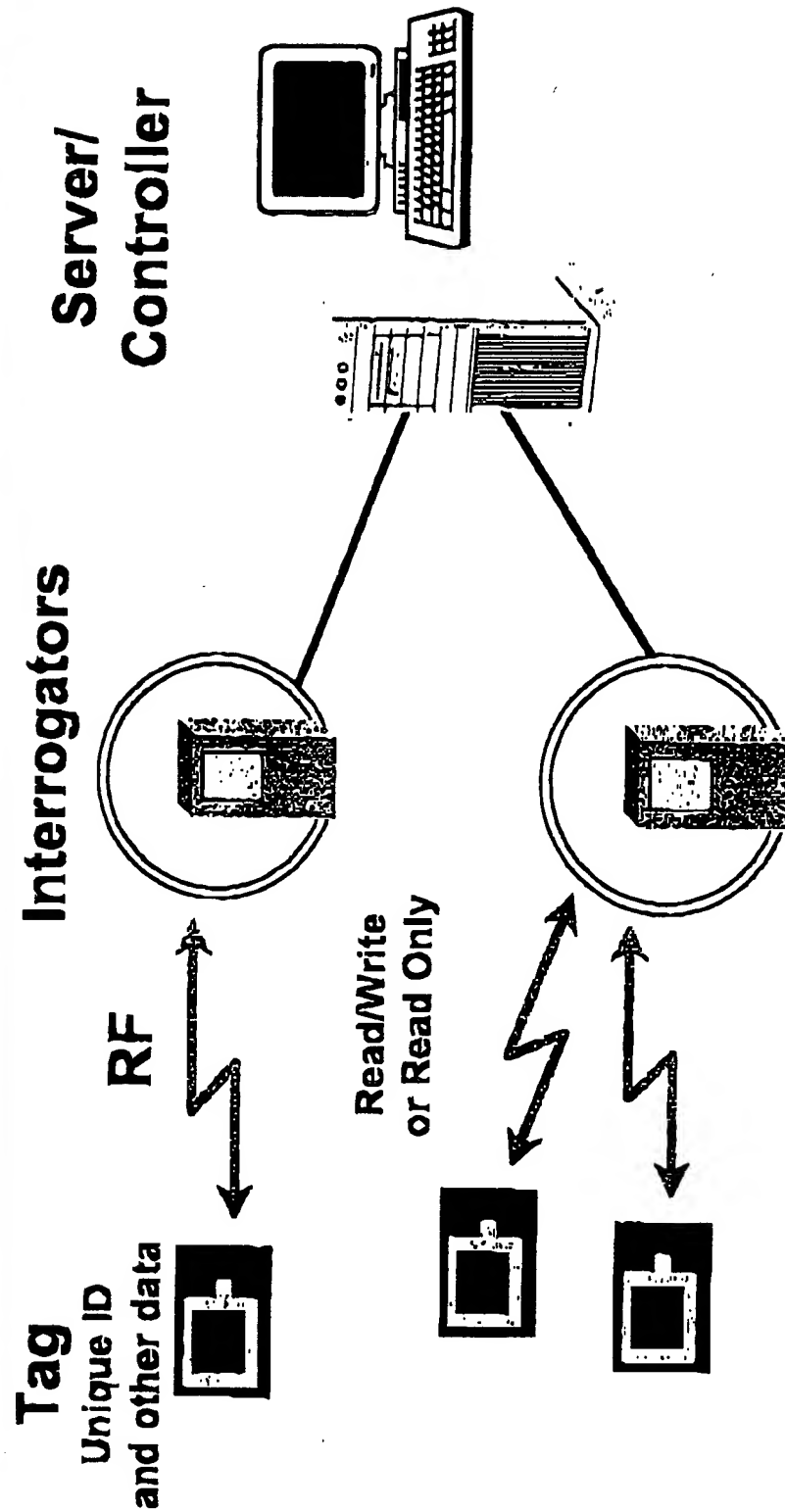
- Background Technology - RFID
 - Application Domains - Current and future
 - Barcoding - Advantages and disadvantages
 - R&D plan - Innovation and feasibility
 - Technical approach - Tasks and costs
 - Summary
-

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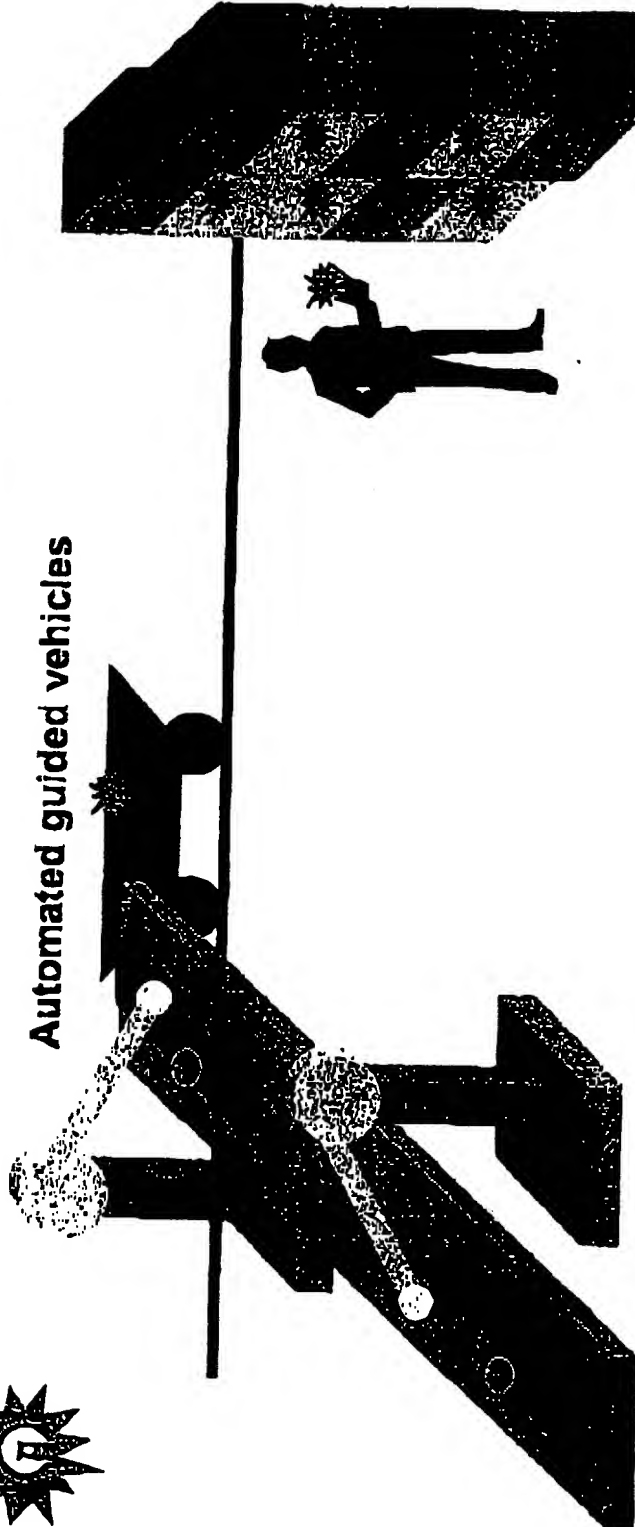
RFID Technology



Applications: Manufacturing



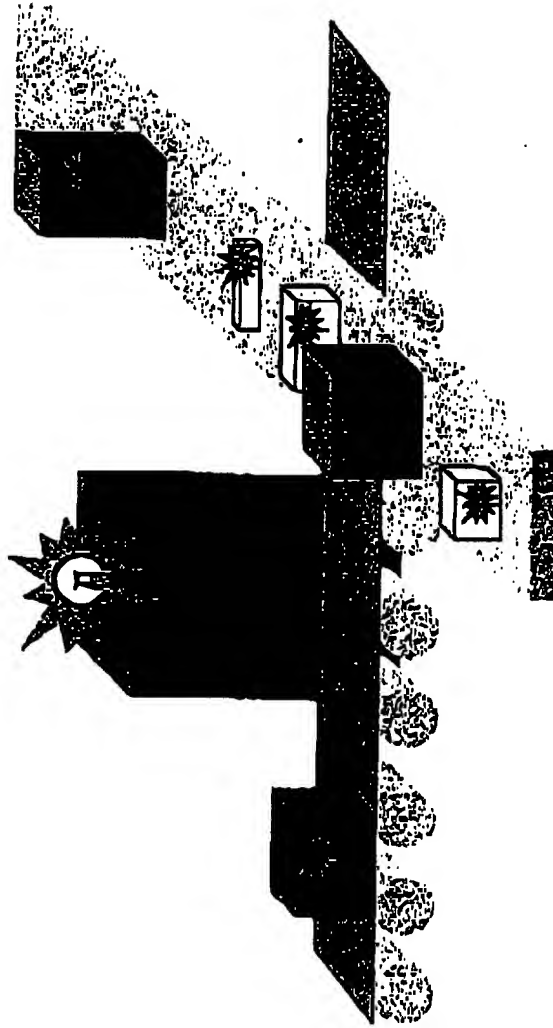
Automated guided vehicles



Flexible manufacturing optimization
Work-in-progress data

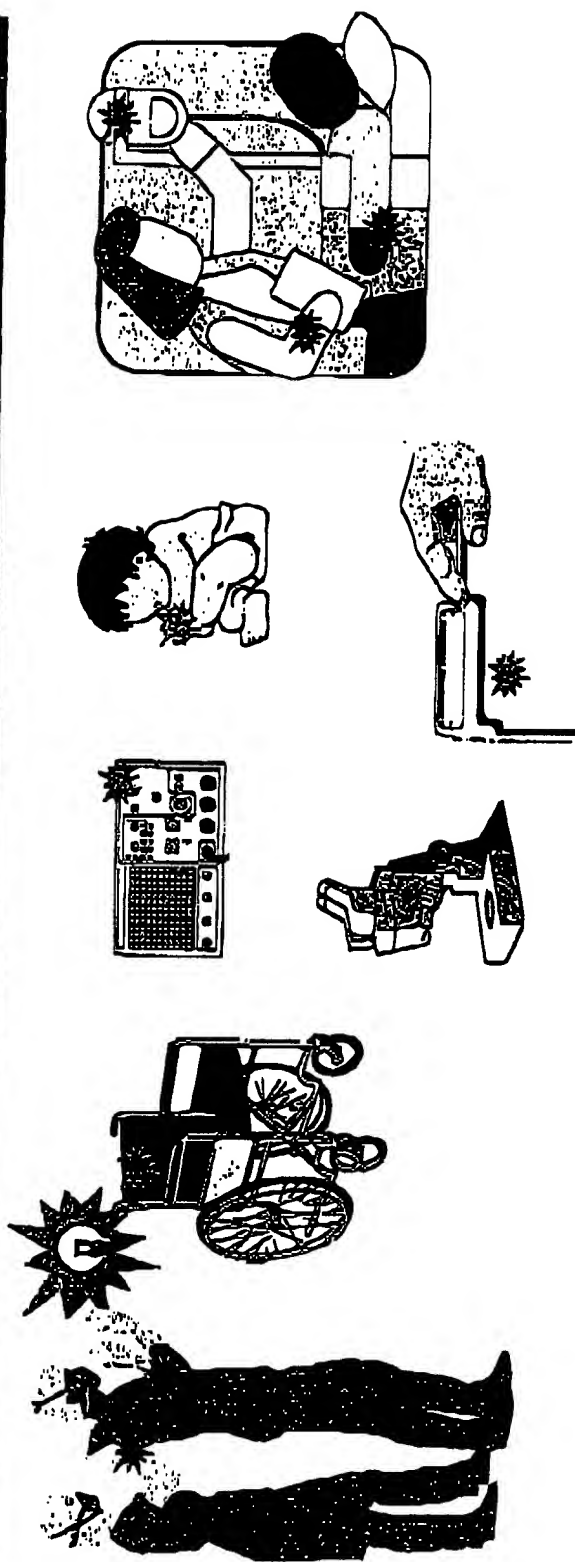
Parts and products inventory
Just-in-time processes

Applications: Postal



- No Line-of-sight requirement between tag and interrogator.
 - Faster than barcode reading.
-

Applications: Health Care



- **Locate doctors and nurses in emergencies.**
- **Locate valuable, easily misplaced mobile assets.**
- **Keep track of infants and Alzheimer's patients.**
- **Locate files for patients with multiple care providers.**
- **Track who administered what medication to what patient at what time.**

Applications: Other

- Military: Automated logistics, "Total Asset Visibility."
 - Airline baggage handling.
 - Railroads: Locate engines, cars, and cargo.
 - Trucking: Cargo management and automated fuel pumping.
 - Security: Access control.
 - Electronic home arrest.
 - Retail store theft detection and prevention.
 - Context sensitive computing, Active Office: computer equipment responds to inputs based on context of its location and the people and assets that are nearby.
-

Barcoding and RFID



Barcoding

RFID

- | | |
|--------------------------------------|---|
| • Very cheap | • Now relatively expensive |
| • Established technology | • New/growing technology |
| • Short reading range | • Variable reading range - potentially long range |
| • Mechanical or human guided reading | • Automatic proximity reading |
| • Read at set barcode position | • Robust to tag's position |
| • Line of sight | • No line of sight |
| • Serial - slow reading rate | • Parallel - high reading rate |
| • Low data storage capacity | • High data storage capacity |
| • Read only | • Read/Write |
| • No Intelligence | • Integrate intelligence/electronics |
| • "Permanent" tag | • Reusable tags |

The Plan

Need

- LMFS must be aware of and proficient in this technology as a *system integrator* and as a potential source of *new revenue*
- Current implementations rely on proprietary tags and tag readers - Expensive, reduced potential for integration

Assets

- Wireless LAN in building 201 (2.4 GHz compatible with RFID).
- LMFS study and recommendations from 1998.

Innovation

- Develop and present a demonstration system for real time automated location sensing *integrated with LMFS wireless LAN*

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Tasks and Costs

1. Evaluation and selection of vendor
for RFID components 0.5 labor-
months
2. Obtain RFID system hardware \$25,000
3. Investigate and develop method
for integrating RFID tags with
wireless LAN 2.0 labor -
months
4. Develop demonstration
software application 1.0 labor -month

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Summary

- *Innovative* implementation of RFID integrated with wireless LAN technology
 - Increase LMFS capabilities as a system integrator with a *patentable* technology
 - Value to *current customers*: Military, Manufacturers, Postal Services, and Health Care providers
 - Potential to open *new business* areas and customers
 - *Competitive* solution leverages existing infrastructure
 - *Expands* and builds upon our current competencies
 - *Stay ahead* now rather than catch up later
-

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T-237 P 018/028 F-018

Automatic Asset Location Sensing Innovative Investment [REDACTED] - Proposal

Principal Investigator: John Moody, Ph.D., x6128, john.moody@lnico.com

Opportunity

The automatic identification and tracking of mobile assets, including people, is the technological foundation for solutions to many problems and efficiency losses faced by industry.

- The automobile industry, as well as other manufacturers, needs to handle huge inventories of parts and equipment. Flexible manufacturing optimization and work-in-progress information can not be effectively obtained without real-time knowledge of the location of parts on the factory floor.
- The postal service already tracks trays, parcels, packages, and letters in processing centers through bar-coding. The efficiency and productivity of this system would be increased if the line-of-sight and reading time requirements of bar-coding could be reduced or eliminated.
- Hospitals suffer from many problems due to imprecise, inaccurate, or nonexistent information relating to location of assets and people. Patients with Alzheimer's Disease and children may wander from their given wards. Medical personnel need to be located quickly in times of emergencies. Mobile assets with limited numbers like wheelchairs, gurneys and portable diagnostic machines are often misplaced. Systems need to insure that newborn babies are not inadvertently or purposely removed by the wrong people. Patient files can be misplaced, and this problem occurs most often with the patients that require the most care from a variety of different specialists. Patients with complex medication regimes are sometimes dealt incorrect dosages or drugs.
- The military recognizes the need for the real-time knowledge of asset location in their thrusts toward automated logistics and "Total Asset Visibility."

All of the areas above require or would benefit from real-time asset location information. There are many other application areas as well, including the airline, railways, and trucking industries, automated toll collection, automated fuel pumping, "electronic home-arrest," retail selling, and "active office" context-sensitive personal computing.

The widespread use of local positioning systems has been limited in part due to the proprietary hardware and software components of existing systems. Special purpose positioning hardware generally has no other function beside its single intended purpose. An LMFS solution for automated location sensing that takes advantage of open protocols and extends existing infrastructure would provide new opportunities for commercial and federal business by extending our information technology modernization business to non-traditional users and providing new capabilities for established users.

Objective



We will develop and present a demonstration system for automated location sensing of mobile assets within the Owego office environment. The target environments include the Open Systems Lab and CDM Center and may include all areas that are currently being installed with wireless LAN access. The RFID-based system will run on top of the wireless LAN, underlining the LMFS capability for integrating diverse systems and extending the functionality of old systems.

Approach

Radio Frequency Identification (RFID) provides a reasonably low cost and accurate foundation for an automated asset tracking architecture. An RFID system involves tags and readers. Tags are placed on the assets to be tracked and the readers respond to and recognize the presence of the tags within a limited range. Communication between tags and readers is carried out on radio frequencies, each tag either actively or passively transmitting its own unique identification code (and possibly other relevant data). The location of assets is determined simply by observing which fixed-position reader, with its limited sensing range, is picking up the presence of a given tag.

RFID systems are available that operate in the 2.4 GHz range, which is the same carrier frequency used by the wireless LAN that is currently being installed at the Owego site. The access points of the wireless network are very similar to RFID readers. Integration of the RFID system with the existing wireless LAN will be investigated and implemented if feasible.

Software for accessing the location information and demonstrating the use of the system will be developed, and the necessary RFID hardware will be installed.

Schedule

- Evaluation and selection of vendor for RFID system, purchase RFID system hardware.
- Investigation of wireless LAN as replacement for proprietary RFID readers.
- Install RFID system.
- Develop LAN integration software.
- Develop demonstration software application

LOCKHEED MARTIN **IR&D CERTIFICATION CHECKLIST**IR&D PROJECT NUMBER: A001 IR&D PROJECT TITLE: Automatic Asset Location Sensing

I certify that the IR&D funds requested / incurred are / will be used to fund IR&D effort that falls within the categories of:

- ☐ Basic Research
- ☒ Applied Research
- ☒ Development
- ☒ Systems and other Concept Formulation Studies

as defined in FAR 31-205.18, MI 04-40

I further certify that this IR&D effort:

- A. Is not sponsored by or required in the performance of a Contract, Grant or in support of a Proposal submission.
- B. Is not required to develop or improve in-house Tools, Processes, Methodologies, etc. which typically are not intended for sale.
- C. Is not directly associated with the design of a New Facility.
- D. Is not associated with a Marketing Analysis, Survey or Study.

IR&D Project
First Level Manager: _____

Date: _____

Site Technical
Planning Manager: _____

Date: _____ (Bruce Davie)



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Federal Systems**LOCKHEED MARTIN****Lockheed Martin Proprietary Information**
(When Completed)**FUNDING AUTHORIZATION FORM**

Return Completed Form with ALL Signatures To: TECHNICAL PLANNING / DEPT 88C MD 0154

Does this Project have ITARS Issues associated with it? (Check One):

☐ YES: ITARS Issues Exist☒ NO: ITARS not an Issue

Authorization to put this information on the internal Lockheed Martin Web:

☒ YES: (Password Protected)☐ NO: Not for Web AccessBUSINESS AREA (Check One):
Systems☐ Aerospace Systems☐ Postal☐ Manufacturing☒ ITM☐ ESUK/Naval

REASONS FOR REQUEST (Revisions Only):

IS THIS A SITE DCAed PROGRAM DEPENDENCY? YES _____ NO X IF YES, WHICH PROGRAM _____

IF YES, HAVE YOU NOTIFIED PRICING? YES _____ NO _____ NAME _____ EXT _____

DIRECTIONS:

PLEASE FILL OUT THE "TO" COLUMN IF BUDGET IS BEING TRANSFERRED FROM AN EXISTING OR CANCELLED TASK TO ANOTHER TASK.

**TRANSFER FROM
EXISTING BUDGET****INITIAL REQUEST
or
TRANSFER TO BUDGET**

CURRENT PCI NUMBER

CURRENT PCI TITLE

PRINCIPAL INVESTIGATOR

WORK PACKAGE

A001Automatic asset location sensingJohn Moody**FINANCIAL SUMMARY (\$\$ AT FACTORY COST)**

YTD ACTUALS

CURRENT BUDGET (A)

DELTA BUDGET (B)

TOTAL BUDGET (A-B or A+B)

37,50037,500**SIGNATURES:****SIGNATURE:****PRINT NAME:****DATE:**

WORK PACKAGE MANAGER (FROM)

Required for Transfers

WORK PACKAGE MANAGER (TO)

ADDITIONAL (As Required)

EXECUTIVE

STRATEGIC MARKETING ANALYSIS

CONTROLLER

Bruce Davis

Robert Voip

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T-237 P 022/028 F-016

Asset Tracking Demo

Hardware Prereqs

- Toshiba Satellite 4015 CDT Laptop on medical cart with Symbol wireless card (functioning)
- Symbol WLAN functioning
- Mobile device with Symbol wireless card functioning
- Two walkie-talkies

Software Prereqs

- GIS software on laptop installed on Toshiba Satellite 4015 CDT on medical cart
- Custom Asset Tracking code installed on Toshiba Satellite 4015 CDT on medical cart
- Mac address of mobile devices WLAN card in file "MobileUnits.txt" in c:\rfid\201bdemo

Presentation Prereqs

- Projector available for viewing tracking software on Toshiba Laptop

Other Prereqs

None

Setup

1. Turn on Toshiba Satellite CDT laptop located on medical cart
2. Start up GIS software, *ArcView* shortcut on desktop
3. Choose "Open an existing project"
4. Navigate and open file c:\rfid\201bdemo\201bdemo.apr

Instructions

1. Begin by running the program to verify that the mobile device is located in the CIM center. The program is started by clicking on the icon marked with a "tag". It is also the right most icon on the second layer of icons at top of window.
2. Select the mobile unit from the drop down list, making sure it matches, especially the Mac address, with the one being used for the demo. If the person with the mobile device has not left the CIM center it should have the rooms highlighted near the CIM.
3. Have the person leave with the mobile device and head up towards the OSE lab, give them time to re-associate with another access point and run the application again. It should show a new area highlighted. If it does, tell them where they are over the walkie-talkie. The person with the mobile device should say "yes" that is where they are...no matter where they really are. This has never been an issue but just in case.
4. Have them continue up to the end of 201B and run the application again showing them located at the end.
5. Have them return to the CIM center.

Important ideas and concepts

With the same WLAN infrastructure already employed for other uses (IP phones, mobile computers), an asset tracking system can be employed at minimal cost. Note that things already using the WLAN system tend to get lost (being mobile) so there is synergy here. No other separate RFID infrastructure is required to be deployed.



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T-237 P 023/028 F-016

Contact**Eric Steinbrecher, eric.steinbrecher@lmco.com, x2585****John Moody, john.moody@lmco.com, x6128**

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T-237 P 024/028 F-016

Invention Disclosure

| Under Evaluation | | | | |
|--|---|---|--------------------|---|
| Invention Title Asset Tracking Using Wireless LAN Infrastructure | | | | |
| Disclosure No FS-00504 | Functional Manager Lubniewski, Stephen E. | Receiving Date/Time 9:56:17 AM | | |
| Patent Attorney Cogan, Robert P. (Rob) | Technical Review Person Fritz, R. L. (Rodger) | Functional Area Owego - Systems Solutions | | |
| Inventor Moody, John O. | Emp.Serial 114691 | Div./Dept. 15/L481 | Bldg 101 | Phone 1-607-751-6128 |
| Electronic Address john.moody@lmco.com | | Manager's Name Gaska, M. T. (Marilyn) | | Manager's Electronic Address marilyn.gaska@lmco.com |
| Inventor Steinbrecher, Eric R. | Emp.Serial 111605 | Div./Dept. 15/8771 | Bldg 101 | Phone 1-607-751-2585 |
| Electronic Address eric.steinbrecher@lmco.com | | Manager's Name Barney Jr, B. H. (Bruce) | | Manager's Electronic Address bruce.barney.jr@lmco.com |

Lockheed Martin Proprietary Information

| | |
|-----------------|--|
| Problem: | <p>Radio Frequency Identification (RFID) is a technique for identifying, authenticating, and/or tracking mobile assets or individuals. Applications range from theft deterrence in retail establishments to global supply chain problems. The technology uses radio interrogators to detect the presence of nearby RF transceivers, known as tags. Tags may either be active or passive (powered or unpowered) and have a variety of sizes and capabilities.</p> <p>Current RFID solutions rely on proprietary, dedicated hardware. They can not be adapted for other data-intensive applications beside RFID, products from different vendors are not interoperable, and they may interfere with or experience interference from other radio frequency (RF) applications used in the same environment.</p> <p>Wireless local area networks (LAN) use frequency ranges and communication capabilities similar to those required for RFID. By integrating the data networking capabilities of wireless LAN with the asset tracking and identification capabilities of RFID, two valuable services can be provided with the same infrastructure. This invention involves the use of a wireless LAN to perform the functions of RFID. Standard wireless LAN access points serve their intended function a</p> |
|-----------------|--|

...ll as working as RFID interrogators. Trackable assets include any mobile computers operating on the wireless LAN, as well as any object carrying a specialized tag, capable of responding to the communication signals of the wireless LAN.

Wireless LAN RFID Solution:

Use standard wireless LAN access points instead of proprietary RFID interrogators. Using SNMP, WNMP, or some other access point communication protocol, query the access points for information regarding visible mobile units and/or tags.

Use a Geographic Information System (GIS) or some other form of database to provide a mapping between access points and their locations within the building. Other information may also be stored here including site surveys, etc. The information from this system is combined with the real-time information from the access points to provide location information on assets visible to the wireless LAN.

Solution:

The mapping of access point data to physical locations may be accomplished by several methods. The simplest way is to simply indicate a proximity to each access point, based on the range of the LAN and which access point is networking with which target device. Accuracy improvements can be made in several ways: Incorporating information from site surveys; query extra access point statistics, such as signal power or packets-per-second; incorporate data from multiple access points for a single asset; employ statistical or intelligent algorithms to choose the most likely location for an asset based on the input data.

Provide the access point and location data to a custom GIS that provides a graphical depiction of asset locations and permits the user to find assets with graphical feedback. Provide asset location data to other external systems through standard data base queries and/or an open application program interface.

Any device that can be detected by an access point is an asset that may be tracked by this system. The obvious candidate is a computer equipped with a wireless LAN card. However a small custom radio tag, attached to the actual tracked asset or individual and capable of identifying itself using wireless LAN network protocols, provides the system with the conventional functionality of RFID.

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T-237 P 026/028 F-016

| | |
|--|--|
| If this problem has been solved before, how was it solved? | <p>urrent RFID solutions are proprietary . dedicated to the given application, they do not provide data networking for other wireless computing devices. Wireless LAN monitoring tools are sometimes capable of providing information regarding which wireless computing devices are visible or routed through which access points. However this information has not been integrated into a complete tracking solution, nor has the functionality been extended from mobile computers to lighter RF asset tags.</p> |
| Why is your solution better? | <p>The solution provides wireless LAN and RFID asset tracking functionality with the same infrastructure, making it cheaper and/or more easily adopted for many applications.</p> <p>As opposed to the currently closed, proprietary RFID solutions, this solution may implemented through a wide range of extant wireless LAN products.</p> <p>RFID solutions may be hindered by interference from a wireless LAN that is required in the same area as asset tracking. This solution solves that problem by using the same infrastructure for both.</p> <p>The existence of such a system makes it very easy for the implementer to integrate other data intensive wireless applications without having to add a new wireless infrastructure. Furthermore, the presence of an actual TCP/IP based wireless network makes possible many complex data-interactions that are not possible or too difficult to implement with current RFID technologies. Possibilities include smart tags with onboard CPU's and networking capabilities and the potential for direct connections between tags and the Internet, intranets, or the Web.</p> |
| Which actual or potential competitor would want to use your solution? | <p>There is great potential that the vendors and manufacturers of wireless LAN and RFID products would want to license this invention. The need for both wireless data connection and asset tracking has been seen in several Owego business areas including postal, healthcare, and logistics support. A dual solution for this need will give Owego an advantage over our competitors in these areas.</p> <p>The RFID and wireless LAN markets are growing rapidly and provide considerable commercial opportunities. The obvious benefits and visibility of this invention upon implementation make it imperative that Lockheed Martin seek an actual patent on this technology, rather than classifying it as a trade secret that is sure to be discovered by other inventors. The dual use of wireless LAN and RFID is easy to observe in practice, highly simplifying the procedure of policing and protecting the patent.</p> |

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T-297 P 027/028 F-018

| | |
|--|--|
| Lockheed Martin Proprietary Information. | |
| Please provide keywords to be used in the event a patent search is performed: | Radio Frequency Identification, asset tracking, wireless local area network. |
| Please provide an abstract of your invention: | Radio Frequency Identification (RFID) is a technique for identifying, authenticating, and/or tracking mobile assets or individuals. Applications range from theft deterrence in retail establishments to global supply chain problems. The technology uses radio interrogators to detect the presence of nearby RF transceivers, known as tags. Tags may either be active or passive (powered or unpowered) and have a variety of sizes and capabilities. Wireless local area networks (LAN) use frequency ranges and communication capabilities similar to those required for RFID. By integrating the data networking capabilities of wireless LAN with the asset tracking and identification capabilities of RFID, two valuable services can be provided with the same infrastructure. This invention involves the use of a wireless LAN to perform the functions of RFID. Standard wireless LAN access points serve their intended function as well as working as RFID interrogators. Trackable assets include any mobile computers operating on the wireless LAN, as well as any object carrying a specialized tag, capable of responding to the communication signals of the wireless LAN. |

| | |
|--|--|
| Critical Date Information | Lockheed Martin Proprietary Information |
| Divuligation Notice | |
| Protection of foreign and domestic patent rights is increasingly significant to Lockheed Martin. In general, if Lockheed Martin files a patent application in the United States before there is any divulgation of a corresponding invention on a non-confidential basis, foreign patent rights will be preserved, but if the patent application is filed after a divulgation, foreign patent rights will be lost even though a United States patent may still be obtainable if the application is filed within a year of the divulgation. Please advise the intellectual property attorney if the answer to any question changes before filing of the patent application. | |
| Estimated date invention reduced to practice: | |
| Invention used in product previously, presently, or in the future? | No |
| If so, Product Name? | |
| Has a product, including the invention or made with the invention, been sold or offered for sale? | No |
| If so, estimate when? | |
| If the invention pertains to a process, have any steps been | |

| | |
|--|------|
| taken to employ the process commercially (e.g. for product production)? | No |
| If so, estimate when? | |
| Has the invention been described in an electronic or printed publication, or disclosed in a talk or paper presented at a public meeting? | No |
| If so, estimate when? | |
| If so, where? | |
| Has the invention been publicly demonstrated or used? | No |
| If so, estimate when? | |
| If so, where? | |
| Has the invention been otherwise described to persons who are not employees of Lockheed Martin (e.g. to vendors or customers)? | No |
| If so, estimate when? | |
| If so, where? | |
| If so, was the invention disclosed under a Proprietary Information Exchange Agreement? | |
| If there has been no public use, sale, divulgation (e.g. publication), is any of these now contemplated? | No |
| If so, estimate when? | |
| If so, where? | |
| Lockheed Martin Proprietary Information | |
| Critical Date Comments: | None |

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T-237 P 028/028 F-018

| Contract Information | | Lockheed Martin Proprietary Information |
|--|----|--|
| Was the invention first conceived or reduced to practice in the performance of work under a U.S. Government contract? | No | |
| If so, please identify the program name: | | |
| If so, please identify the contract number: | | |
| If so, please identify the P.O. number: | | |
| If a subcontract, please identify the customer: | | |

| Attachments |
|--|
| There are no attachments for this invention disclosure |

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- ☐ **GRAY SCALE DOCUMENTS**
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